POONAM LATA YADAV

Atmospheric Refraction –

1. **Apparent Star Position–** It is due to atmospheric refraction of star light. The temperature and density of different layer of atmosphere keeps varying. Hence we have different medium. Distant star act as point source of light. When the starlight enter the earth's atmosphere it undergoes refraction continuously, due to changing refractive index i.e. from Rarer to denser. It bends towards the normal. Due to this the apparent position of the star is different from actual position.
The star appears higher than its actual position.

2. **Twinkling of Star–** It is also due to atmospheric refraction. Distant star act like a point source of light. As the beam of starlight keeps deviating from its path, the apparent position of star keeps on changing because physical condition of earth's atmosphere is not stationary
Hence the amount of light enters our eyes fluctuate some time bright and some time faint.
This is the "Twinkling effect of star"

Q. **Why Planet does not twinkle?**
Ans. Planets are closer to earth and are seen as extended source of light i.e. the collection of large no: of point sized sources of light. Therefore the total amount of light entering our eyes from all individual point source will nullify the twinkling effect.

3. **Advance Sunrise and delayed sunset**
This is also due to atmospheric refraction. Because of this sun is visible about 2 minutes earlier than actual sunrise and about 2 minutes after the actual sun set.

Apparent flattering of the sun's disc at sun set and sun rise is due to atmospheric refraction.

Scattering of Light

Tyndall Effect– When a beam of light strikes the minute particle of earth's atmosphere suspended particles of dust and molecule of air the path of beam become visible. The phenomenon of scattering of light by the colloidal particle gives rise to Tyndall Effect.
It can be observed when sunlight passes through a canopy of a dense forest. The colour of the scattered light depends on the size of the scattering particles.

Very fine particle	Large size particle	Very large enough
scatter mainly blue colour short wave length	Scatter light of longer wave length i.e. red	The sky appear white

(1) **Why cloud Appear white–** The size of water droplet (scattering particle) is very large, hence scattered all wavelength of light almost equally.

(2) **Why colour of sky is blue–** The molecules of air and other fine particles in the atmosphere have size smaller than the wavelength of visible light. Since the blue has shorter wavelength than red, hence it will scattered the most.

According to Rayleigh scattering Scattering of light α $1 / \lambda^4$ (λ – Wavelength) Scattering of light decreases with increase in wavelength

Q. **If there is no earth's atmosphere? What will happen to scattering phenomenon?**
Ans. There will be no scattering and sky will appear dark.

(3) **Colour of the Sun of Sunrise and Sunset -** While sunset and sunrise, the colour of the sun and its surrounding appear red. During sunset and sunrise, the sun is near horizon, and therefore the sunlight has to travel larger distance in atmosphere. Due to this most of the blue light (shorter wavelength) are scattered away by the particles. The light of longer wavelength (red colour) will reach our eye. This is why sun appears red in colour.

(4) **Why the danger signal or sign are made of red colour.**

Ans: Red colour scattered the least when strikes the small particle of fog and smoke because in has the maximum wavelength (visible spectrum). Hence at large distance also, we can see the red colour clearly.

(4) **At noon sun appear white–** At noon the, sun is overhead and sunlight would travel shorter distance relatively through the atmosphere. Hence, at noon, the Sun appears white as only little of the blue and violet colours are scattered.